

A Surprise and a Conundrum About Human Progress

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Outline

- Introduction
 - Quotes, questions, surprise, conundrum
- Data and graphs (lots!) of perception vs. reality re: human progress
- **My requests**
- Class examples
- Conclusion
 - Criticisms, resources, final quote, shameless plug

Quote 1

"How can we soundly appraise the state of the world? The answer is to *count*. ... A quantitative mindset, despite its nerdy aura, is in fact the morally enlightened one, because it treats every human life as having equal value rather than privileging the people who are closest to us or most photogenic." – Steven Pinker

Question A

- In the last 20 years, the proportion of the world population living in extreme poverty has ...?
 - Almost doubled
 - Remained more or less the same
 - Almost halved

Question B

- What percent of the world's 1-year-old children today have been vaccinated against some disease?
 - 20 percent
 - 50 percent
 - 80 percent

Question C

- Worldwide, 30-year-old men have spent 10 years in school, on average. How many years have women of the same age spent in school, on average?
 - 9 years
 - 6 years
 - 3 years

Quote 2

"Over the past twenty years, the proportion of the global population living in extreme poverty has halved. This is absolutely revolutionary. I consider it to be the most important change that has happened in the world in my lifetime." – Hans Rosling

Question A

- In the last 20 years, the proportion of the world population living in extreme poverty has ...?
 - Almost doubled
 - Remained more or less the same
 - **Almost halved**

Question B

- What percent of the world's 1-year-old children today have been vaccinated against some disease?
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 - **80 percent**

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- Worldwide, 30-year-old men have spent 10 years in school, on average. How many years have women of the same age spent in school, on average?
- 9 years
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Quote 3: Surprise

"Here is a shocker: *The world has made spectacular progress in every single measure of human well-being.*

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Quote 3: Surprise and conundrum

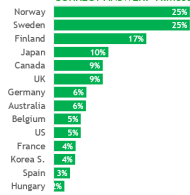
"Here is a shocker: *The world has made spectacular progress in every single measure of human well-being.*

Here is a second shocker: *Almost no one knows about it.*" – Pinker

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Question A (poverty)

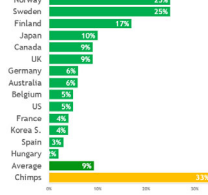
CORRECT ANSWER: "Almost halved"



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Question A (poverty)

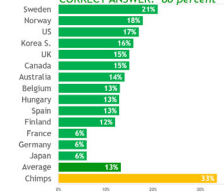
CORRECT ANSWER: "Almost halved"



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Question B (vaccinations)

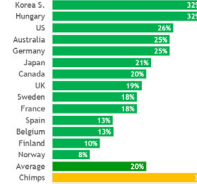
CORRECT ANSWER: "80 percent"



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Question C (schooling)

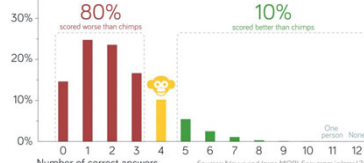
CORRECT ANSWER: "9 years"



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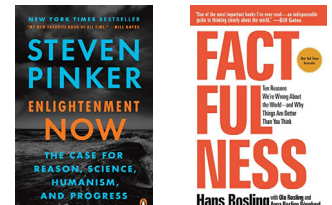
Worse than ignorance

Share of humans with different scores



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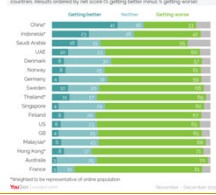
Inspirations for this talk



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Perception: World is getting worse

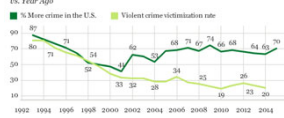
Thinking generally about the world, do things seem to be getting better or worse, or neither getting better nor worse? (All 33 adults in the following countries. Results ordered by net score for getting better versus getting worse.)



Source: Pew Research Center, December 2019

Crime rate: Perception vs. actual

U.S. Violent Crime Rate* and Americans' Perceptions of Crime Rate vs. Year Age

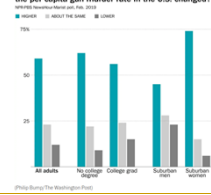


* Violent crime rate is number of victimizations per 1,000 persons that occurred during the year. Source: Bureau of Justice Statistics, National Crime Victimization Survey, 1992-2014. GALLUP

Source: Pew Research Center, December 2019

Gun murder rate: perception

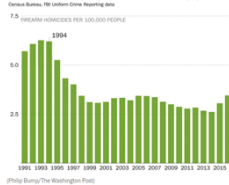
Compared to 25 years ago, how has the per capita gun murder rate in the U.S. changed?



Source: Pew Research Center, December 2019

Gun murder rate: actual

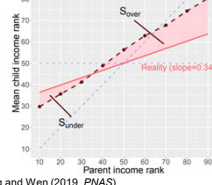
Firearm murders per year as a function of population



Source: Pew Research Center, December 2019

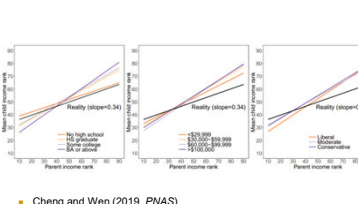
Intergenerational income mobility

Perceived (slope=0.65, 95% CI=[0.62, 0.67])



Source: Cheng and Wen (2019, PNAS)

Intergenerational income mobility



Source: Cheng and Wen (2019, PNAS)

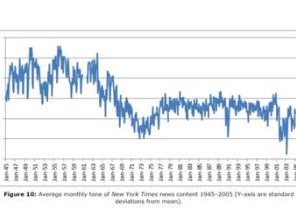
Perceived happiness of others

In every country people think that others are less happy than they themselves are



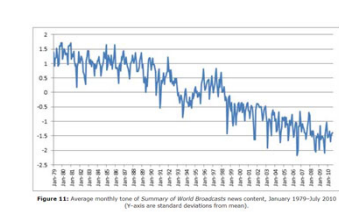
Source: Pew Research Center, December 2019

Sentiment analysis of news (Leetaru)

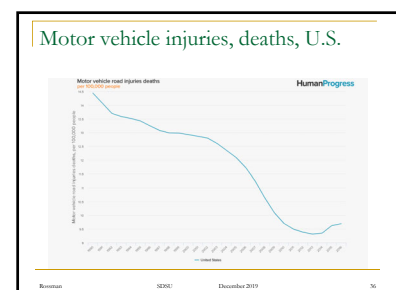
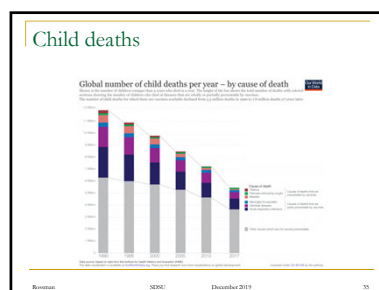
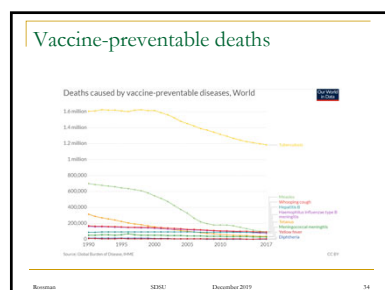
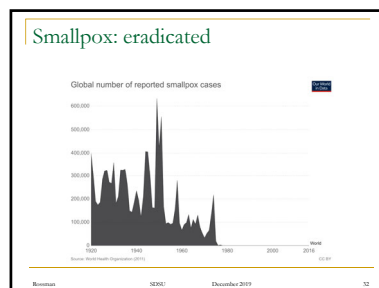
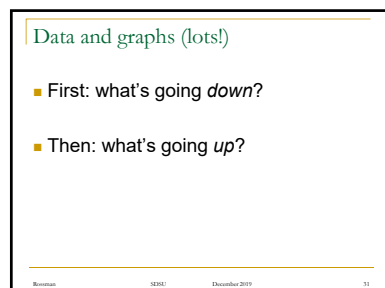
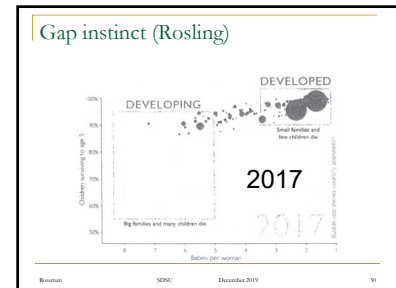
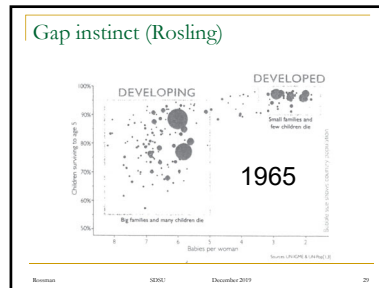
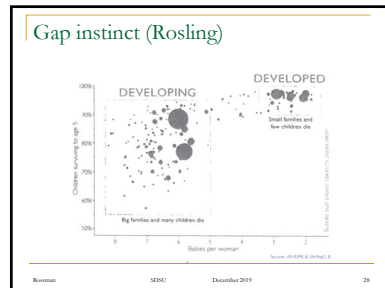


Source: Leetaru (2019, PNAS)

Sentiment analysis of news (Leetaru)

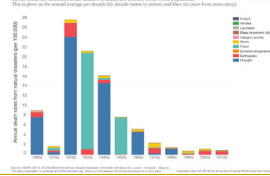


Source: Leetaru (2019, PNAS)



Natural disaster deaths

Global annual death rate from natural disasters, by decade



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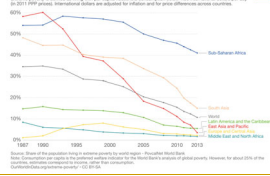
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Extreme poverty

Share of the population living in extreme poverty, by world region



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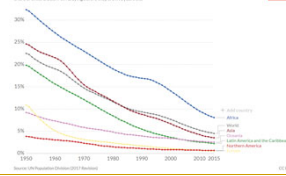
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Child mortality

Child mortality



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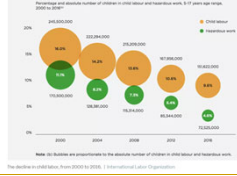
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Child labor

Children's involvement in child labour and hazardous work, 2000-16



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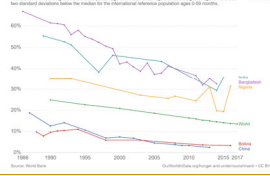
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Child malnourishment

Share of children younger than 5 who are underweight for their age



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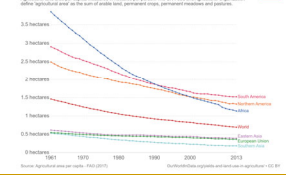
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Agricultural land use

Agricultural area per capita



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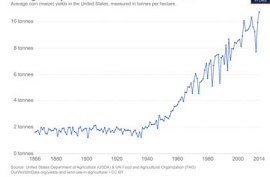
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Crop yields

Average corn yields in the United States, 1866-2014



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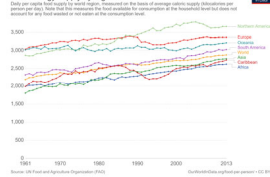
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Food energy supply

Food energy supply by region



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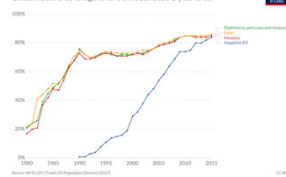
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Vaccine rates

Global vaccine coverage: Share of vaccinated 1-year-olds

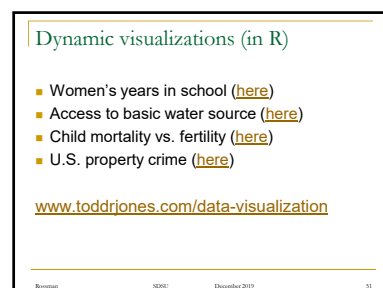
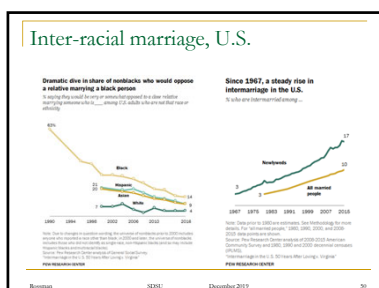
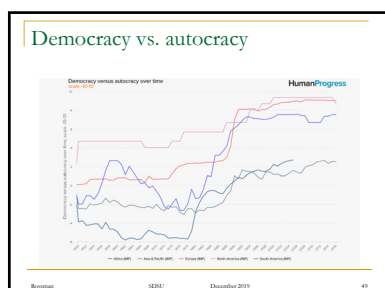
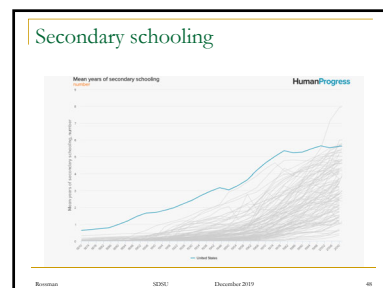
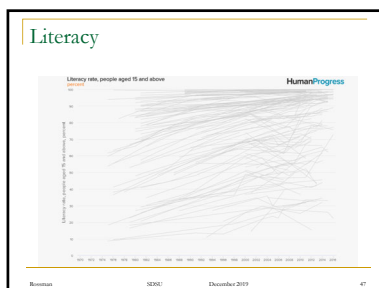
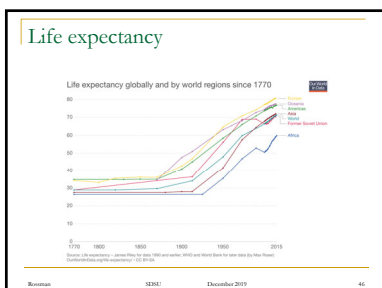


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Please forgive a prideful side comment

- Statistics and statisticians deserve some of the credit for these advances
 - Public health
 - Agriculture
- Old-fashioned, 20th-century statistics
 - Experimental design
 - Clinical trials
 - Statistical inference

HumanProgress

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My requests

- Teachers: Use data, examples, activities, and assignments that make students aware of human progress.
- Students: Make yourselves aware of human progress, and share your knowledge with peers.

HumanProgress

December 2019

Example 1: Health vs. wealth

Students watch Rosling's video on "200 countries, 200 years in 4 minutes"

<https://www.youtube.com/watch?v=ibkSRLYSojo>

HumanProgress

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Example 1: Health vs. wealth

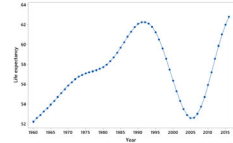


Example 1: Health vs. wealth

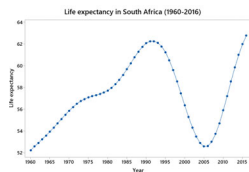
- Identify the observational units in this graph.
- Identify all of the variables in this graph.
- Classify each variable as categorical or numerical.
- Describe the association between income per person and life expectancy.
- Describe what the graph reveals about any relationship between regions of the world and health/wealth.

Example 2: Life expectancy in ...

- Describe what this graph reveals.
- Make an educated guess for the country.



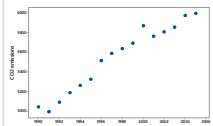
Example 2: Life expectancy in ...



- Explain what happened in the 1990s.

Example 3: CO2 emissions

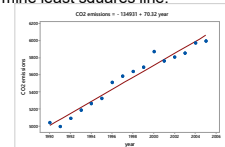
- Energy-related CO2 emissions (in millions of metric tons) in the U.S. from 1990-2005



- Source: <https://www.eia.gov/environment/emissions/carbon/>

Example 3: CO2 emissions

- Describe what graph reveals.
- Determine least squares line.

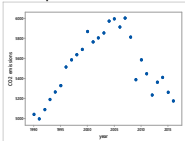


Example 3: CO2 emissions

- Interpret the slope coefficient of the line.
- Use the line to predict CO2 emissions for the year 2016.
Predicted CO2 emissions in year 2016
 $= -134,931 + 70.32 \times 2016 = 6834 \text{ mmt}$
Actual CO2 emissions in year 2016: 5170 mmt
- Determine percentage error of the prediction
 $(6834 - 5170) / 5170 \times 100\% \approx 32.2\%$

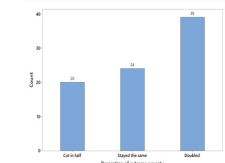
Example 3: CO2 emissions

- What went wrong??
Beware of extrapolation



Example 4: Global poverty question

Data from a recent class of mine ($n = 83$)

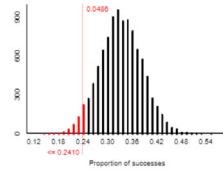


Example 4: Global poverty question

- Do the sample data provide strong evidence that less than one-third of all students at the university would answer correctly (i.e., that students do worse than chimpanzees would)?
- Simulation-based inference

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Example 4: Global poverty question



- Moderately strong evidence ($p\text{-value} = .0486$) that less than one-third would answer correctly

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Example 5: Global poverty question

- U.S. survey: 5% of 1005 answered correctly
- Do the sample data provide strong evidence that less than one-third of all Americans would answer correctly?
- Test statistic: $z = \frac{.05 - .3333}{\sqrt{\frac{.3333 \times .6667}{1005}}} \approx -19.1$ (!!!)
- Overwhelming evidence that Americans do worse than random guessing on this question

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Example 6: Global poverty question

- U.S. survey: 59% of 1005 answered "doubled"
- Estimate the proportion of all U.S. adults who would answer "doubled" with 95% confidence
 $.59 \pm .030: (.560, .620)$
- Interpret this interval.
 - We are 95% confident that between 56% and 62% of all U.S. adults would give the most wrong answer to this question.

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Disclaimer

- I also believe that:
- Enormous progress remains to be made.
 - Teachers should also present data, examples, activities, and assignments that expose problems and inequities.
 - Students can be motivated to address societal challenges by such exposure.

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Criticisms

FEATURED • MARCH 27, 2019
Why You Shouldn't Listen to Self-Serving Optimists Like Hans Rosling and Steven Pinker

There's a reason Bill Gates loves Pinker and Rosling—their analyses obscure inequality.
BY ROLAND PAULSEN
inthesetimes.com

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Criticisms

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Why Do People Love to Hate Steven Pinker?
By proclaiming the gospel of human progress, the Harvard psychologist has made a lot of enemies.
The Chronicle Review

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Household income (inflation-adjusted)



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For more information

- Steven Pinker, *Enlightenment Now*
- Hans Rosling, *Factfulness*
- www.gapminder.org
- ourworldindata.org
- humanprogress.org
- www.worlddata.io/
- informationisbeautiful.net/beautifulnews/
- www.toddrjones.com/data-visualization
- twitter.com/hashtag/GoodNewsGraphs

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Quote 4

"If you could choose a moment in history to be born, and you didn't know ahead of time who you were going to be, you'd choose *now*. Because the world has never been less violent, healthier, better educated, more tolerant, with more opportunity for more people, and more connected than it is today."

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Quote 4

"If you could choose a moment in history to be born, and you didn't know ahead of time who you were going to be, you'd choose *now*. Because the world has never been less violent, healthier, better educated, more tolerant, with more opportunity for more people, and more connected than it is today."
– President Barack Obama, July 20, 2016

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Thanks!

- Shameless plug for my weekly blog about teaching introductory statistics: askgoodquestions.blog
 - These slides can be found there under "Presentations"
- Contact me with questions and comments: arossman@calpoly.edu

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